ISSN 0373-580 X
Bol. Soc. Argent. Bot. 43 (1-2): 61 - 65. 2008

Wood anatomy of *Ribes magellanicum* (Grossulariaceae)

ROBERTO R. PUJANA[1], HERNÁN P. BURRIEZA[2] y MARÍA A. CASTRO[2]

Summary: Wood anatomy description of *Ribes magellanicum* Poir. is given including specimens of its two subspecies. This is the first detailed secondary xylem study of a species included in the South and Central American subgenus *Parilla* Jancz. Wood anatomy of *R. magellanicum* shows the following typical anatomical features cited for northern hemisphere *Ribes* L.: small vessels, rays of two distinct sizes and scalariform perforation plates.

Key words: *Ribes magellanicum*, wood anatomy, secondary xylem, Grossulariaceae, Patagonia.

Resumen: Anatomía de la madera de *Ribes magellanicum* (Grossulariaceae). Se describe la anatomía de la madera de *Ribes magellanicum* Poir. incluyendo especimenes de sus dos subespecies. Es la primera descripción detallada del xilema secundario de una especie del subgénero de Centro y Sudamérica *Parilla* Jancz. La anatomía de *R. magellanicum* muestra las características típicas citadas para las *Ribes* L. del hemisferio norte: vasos pequeños, radios de dos tamaños distintos y placas de perforación escalariformes.

Palabras clave: *Ribes magellanicum*, anatomía de madera, xilema secundario, Grossulariaceae, Patagonia.

Introduction

Ribes magellanicum Poir. is an erect shrub of the Grossulariaceae family that inhabits the subantarctic forests of Patagonia, in Argentina and Chile. It can reach up to 4 m high, showing reddish brown fissured bark on older branches, racemes with yellow to reddish flowers and globose berries purple at maturity (Moore 1983 in Arena *et al.* 2007). According to the classification of Janczewski (1907 in Weigend *et al.* 2002) this species was placed in the subgenus *Parilla* Jancz.*,* that has functionally dioecious species, and in the section *Parilla* jancz (Weigend *et al.* 2002), that includes the four species native to Argentine Patagonia (Sparre 1984) as well as others from Chile. Weigend *et al.* (*op. cit.*) in their molecular analysis of the genus, confirm the placement of the section *Parilla* and the section *Andina* jancz*,* that includes the rest of Southamerican species, in the subgenus *Parilla*.

Several authors have described, mostly superficially, the wood anatomy of the genus *Ribes* L. (Tippo 1938; Record & Hess 1943; Metcalfe & Chalk 1950; Stern *et al.* 1971; Schweingruber 1978; Schoch *et al.* 2004) and even a fossil wood with possible affinity to *Ribes* has been mentioned by Page (1970). In spite of the abundance of *R. magellanicum* in Patagonia, the wood anatomy of neither this species, nor any of the subgenus *Parilla,* have ever been described in detail. Regarding all the Argentinian species, only some aspects of the wood anatomy of *Ribes cucullatum* Hook. & Arn. have been mentioned by Cozzo (1946).

This contribution makes a detailed description of the secondary xylem anatomy of *R. magellanicum,* including its two subspecies: *R. magellanicum* subspecies *magellanicum* and *R. magellanicum* subspecies *parviflorum* (Phil.) Sparre. The two subspecies have been considered at species level by some authors (i.e. Reiche 1898). It is compared with known woods of northern species of the same genus. Wood anatomy of this species can be useful as a taxonomic tool, as well as for determination of archaeological and fossil woods.

[1]Museo Argentino de Ciencias Naturales, Ángel Gallardo 470, C1405DJR, Ciudad de Buenos Aires, Argentina. rpujana@macn.gov.ar
[2]DBBE, Facultad de Ciencias Exactas y Naturales, UBA, Intendente Güiraldes 2160, C1428EGA, Ciudad de Buenos Aires, Argentina.

Materials and Methods

The two studied plants have been collected at two different localities of Argentinian Patagonia. Both are permanently housed at the herbarium of the Museo Argentino de Ciencias Naturales (MACN), under reference numbers BA 53057 and BA 91927. The specimen of *R. magellanicum magellanicum* (BA 53057) was collected by Cozzo in Bahía Aguirre, Puerto Español, Ushuaia department, Tierra del Fuego province in 1949. The specimen of *R. magellanicum parviflorum* (BA 91927) was collected by one of the authors (RRP) in Lago Fontana, Río Senguerr department, Chubut province in 2007 at a height of 950 metres above sea level and was compared with herbarium specimens of the MACN for determination.

For the study of the woods, slides have been made following standard techniques (O'Brien & McCully 1981; D'Ambrogio de Argüeso 1986). Macerations were also made to complement the study, following the procedures of Boodle (1916). The anatomy description was made following the I.A.W.A. list of microscopic features for hardwoods identification (I.A.W.A. 1989). The measures are given by the mean followed by the range between parentheses and were calculated by observing both specimens.

The microscopic slides were observed under optical microscopes (Olympus BX51) and small fragments of the specimen BA 91927 were observed under a Philips XL30 scanning electron microscope (SEM).

Description

Studied stems have a diameter of up to 25 mm. Growth ring boundaries are delimited by 3 to 8 rows of radially flattened latewood tracheids and by the slightly decrease of vessel diameter (Fig. 2: B). Wood is diffuse to semi ring porous. Vessels are grouped in tangential series in the earlywood and with a slight tendency to show diagonal patterns in the latewood (Fig. 2: A). Vessels exhibit angular outline and very thin walls. They have a tangential diameter of 29 (17-49) µm and a density of 220 (155-350) vessels per mm^2 (Fig. 2: A, B). Vessel elements are 402 (284-496) µm in length. Perforation plates are oblique and scalariform, with 8 to 19 bars, occasionally branched (Fig. 2: C, D). Intervessel pits are elliptic to oval in shape and show a scalariform to alternate arrangement (Fig. 1, 2: E, F). Vessel-ray pits are circular in shape and crowded (Fig. 2: J). Libriform lignified fibres are abundant and

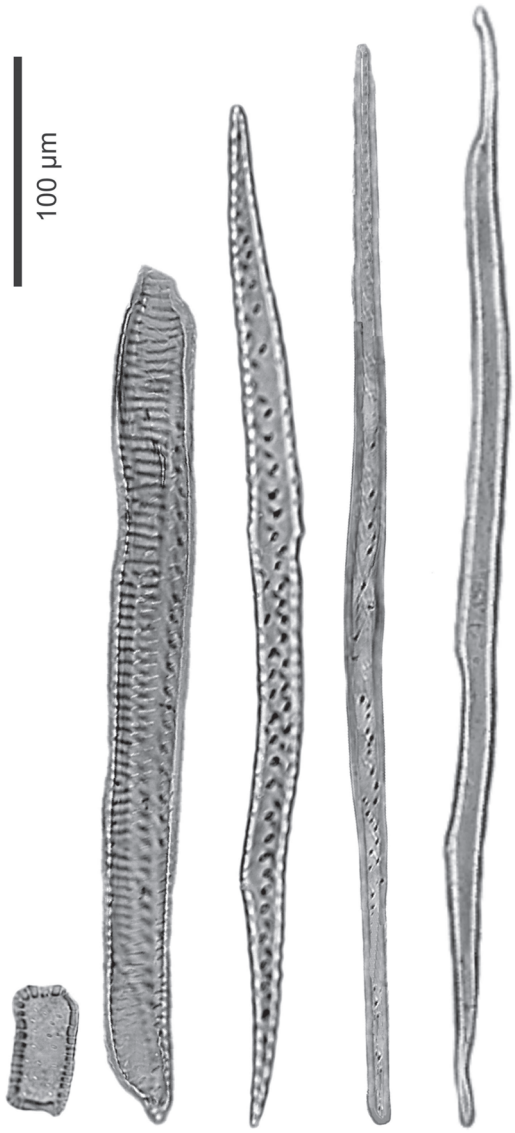

Fig. 1. Secondary xylem cells from macerations. From left to right, parenchymatic ray cell, vessel element, vasicentric tracheid, fibretracheid and libriform fibre.

constitute the main mass of the wood, they are sometimes septated, thin to thick walled, with simple pits of *ca.* 1 µm in diameter and 518 (434-646) µm in length. Scarce gelatinous fibres from reaction wood are present. Fibres with bordered pits (fibretracheids) are also present, sometimes with expanded inner aperture (Fig. 1) and ca. 445 µm in length. Vasicentric tracheids show bordered pits *ca.* 4-5 µm in diameter, and the length is similar to the fibretracheids (Fig. 1). Rays are of two distinct sizes (Fig. 2: G). Uniseriate rays are 1 to 6 cells high and with a size similar to

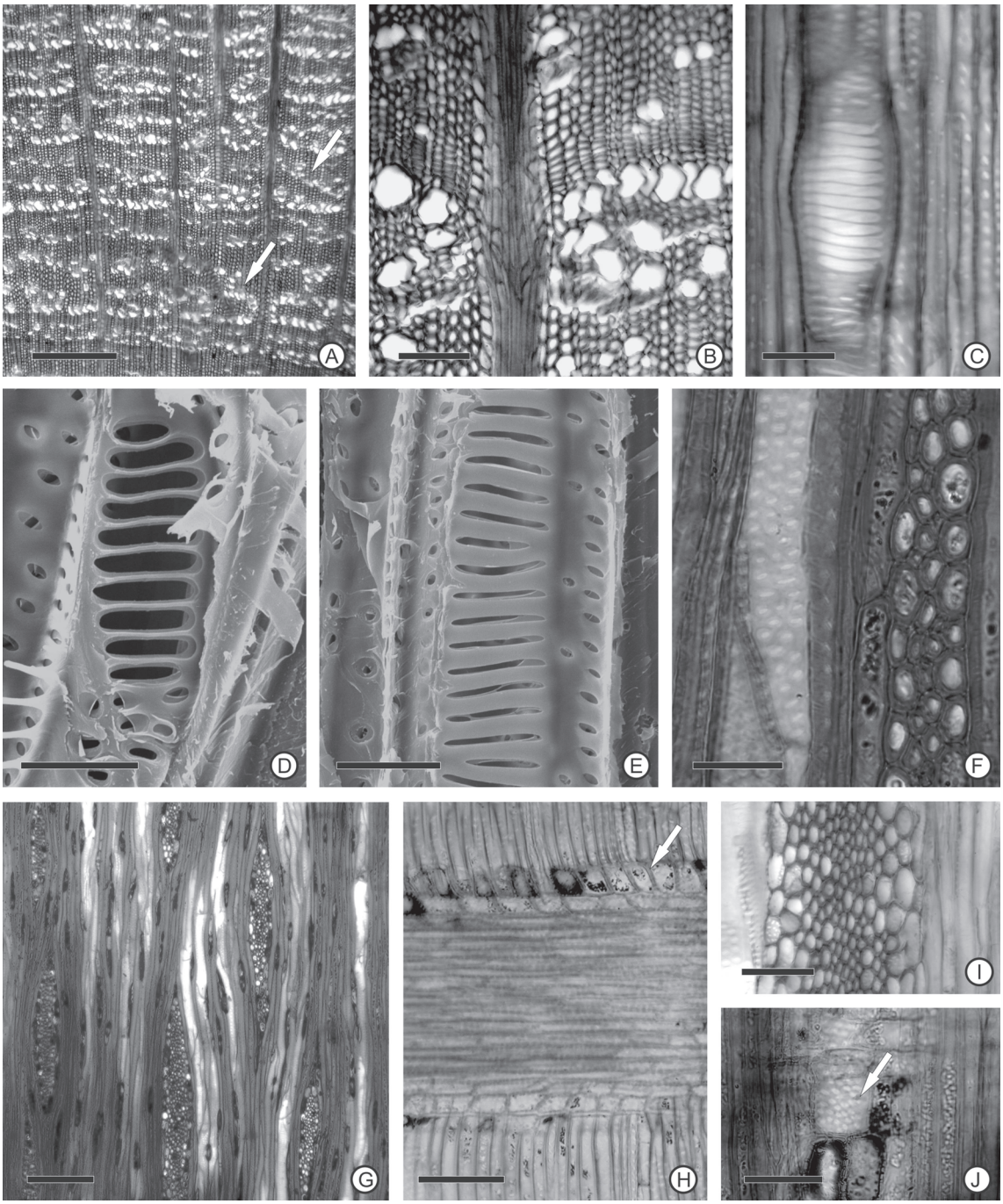

Fig. 2. *R. magellanicum* subsp. *magellanicum* (**B, C, I**), *R. magellanicum* subsp. *parviflorum* (**A, D-H, J**). **A.** General aspect of transverse section showing diagonal (arrows) and tangential vessel pattern (TS). Bar: 500 µm. **B.** Detail of a growth ring boundary and thin walled vessels in tangential pattern (TS). Bar: 100 µm. **C.** Scalariform perforation plate in radial longitudinal section (RLS). Bar: 20 µm. **D.** Scalariform perforation plate at SEM. Bar: 20 µm. **E.** Intervessel pits showing scalariform to opposite arrangement at SEM. Bar: 20 µm. **F.** Intervessel pits showing opposite to alternate arrangement in tangential longitudinal section (TLS). Bar: 20 µm. **G.** Rays of two distinct sizes (TLS). Bar: 200 µm. **H.** Detail of a ray with upright marginal ray cells (arrow) (RLS). Bar: 100 µm. **I.** Detail of a multiseriate ray (TLS). Bar: 50 µm. **J.** Crowded vessel-ray pits (arrow) (RLS). Bar: 50 µm.

those of the sheath cells of the multiseriate rays. Multiseriate rays up to 19 cells in width, show a distinct sheath of 1 to 3 layer cells (Fig. 2: I), rarely have uniseriate extensions, can sometimes reach more than 1 mm in height and are in a frequency of 1 or 2 per mm. Heterocellular rays are composed of procumbent, square and upright cells. Upright marginal cells are observed in 1 to 4 rows (Fig. 2: H). Parenchymatic ray cells are conspicuously pitted in transverse, tangential and radial walls; pits are minute, *ca.* 2-3 µm in diameter (Fig. 1).

Discussion

Previous works on *Ribes* wood anatomy have showed that no significant anatomic variability occurs in the genus. In particular, *R. magallenicum* shows all the usual characters assigned to the genus: rays of two distinct sizes, multiseriate rays with sheath cells, small vessels with a tendency to form tangential series, scalariform perforation plates and vasicentric tracheids.

This species is very similar to northern species. Characters than can vary, compared with northern species, are mostly quantitative. The vessel diameter is slightly smaller, perforation plates have more bars and multiseriate rays seem to be shorter for patagonian *R. magellanicum*. Other conspicuous characters that vary from other described species of the genus are: the absence of axial parenchyma, rare in some northern species (Stern *et al.* 1971; Schoch *et al.* 2004), and the presence of pronounced angular vessel outline, because of the thin wall, especially in the specimen of the subspecies *parviflorum*. Vasicentric tracheids were previously cited for *Ribes* (Metcalfe & Chalk 1950; Stern *et al.* 1971). Because of the abundance of bordered pits and the disposition of them near to the vessels, they are considered vasicentric tracheids. The two specimens do not show significant variations in the anatomy, except for the increase of the angularity of the vessels of the specimen of subspecies *parviflorum* and higher density of vessels.

Conclusions

This is the first detailed description of the wood anatomy of a species of genus *Ribes* subgenus *Parilla,* including macerations and SEM images. Comparisons with other species of the genus suggest very low variations on the secondary xylem anatomy inside the genus. Although wood anatomy of other species of the subgenus *Parilla* remain unknown, they are expected to be very much alike to the one here described.

Acknowledgements

The authors would like to thank Dr. A. M. Giménez and an anonymous reviewer for their suggestions. They are also grateful to Dr. P. Hoc for the determination of one specimen and J. Molina Lalanne for reading the manuscript. Part of the funds for the work were provided by the project PICT 10747 of the ANPCyT.

Bibliography

ARENA, M. E., M. BERNINI & G. VATER. 2007. Growth and fruiting of *Ribes magellanicum* in Tierra del Fuego, Argentina. *New Zeal. J. Crop Hort. Sci.* 35: 61–66.

BOODLE, L. A. 1916. A method of macerating fibres. *Bull. Misc. Inform. Kew* 4: 108-110.

COZZO, D. 1946. Los géneros de fanerógamas argentinas con radios leñosos altos en sus leños secundarios. *Rev. Arg. Agron.* 13: 207-230.

D´AMBROGIO DE ARGÜESO, A. 1986. *Manual de técnicas en histología vegetal.* Hemisferio Sur, Buenos Aires.

I.A.W.A. 1989. List of Microscopic Features for Hardwood Identification. *IAWA Bulletin n. s.* 10: 219-332.

JANCZEWSKI, E. 1907. Monographie des groiseilliers, *Ribes* L. *Mém. Soc. Phys. Genève* 35: 199-517.

METCALFE, C. R. & L. CHALK. 1950. *Anatomy of the dicotyledons*. Clarendon Press, Oxford.

MOORE, D. M. 1983. *Flora of Tierra del Fuego*. Anthony Nelson, Oswestry.

O'BRIEN, T. & McCULLY, 1981. *The study of plant structure. Principles and methods.* Termarcarphi PTY., Melbourne.

PAGE, V. M. 1970. Angiosperm wood from the Upper Cretaceous of Central California. *Amer. J. Bot.* 57: 1139-1144.

RECORD, S. J. & R. W. HESS. 1943. *Timbers of the new world*. Yale University Press, New Haven.

REICHE, K. 1898. *Estudios críticos sobre la flora de Chile. Vol. 2*. Santiago, Chile.

SCHOCH, W., J. HELLER, F. H. SCHWEINGRUBER & F. KIENAST. 2004. *Wood anatomy of central European Species*. Online version: http://www.woodanatomy.ch. Accessed august 2007.

SCHWEINGRUBER, F. H. 1978. *Microscopic wood anatomy*. Swiss Federal Institute of Forestry Research, Zürcher.

SPARRE, B. B. 1984. Grossulariaceae. *In:* Correa, M. N. (ed.), *Flora Patagónica*, *Volumen 8 Tomo 4b*, pp 19-26. Colección Científica INTA, Buenos Aires.

STERN, W. L., E. M. SWEITZER & R. E. PHIPPS. 1971. Comparative anatomy and systematics of woody Saxifragaceae. *Ribes. J. Linn. Soc. Bot.* 63: 215-37.

TIPPO, O. 1938. Comparative anatomy of the Moraceae and their presumed allies. *Bot. Gaz.* 100: 1-99.

WEIGEND, M., O. MOHR & T. J. MOTLEY. 2002. Phylogeny and classification of the genus *Ribes* (Grossulariaceae) based on 5S-NTS sequences and morphological and anatomical data. *Bot. Jahrb. Syst.* 124: 163-182.

Recibido el 29 de Agosto de 2007, aceptado el 12 de Noviembre de 2007.